

SECTION A. Project Title: Fuel Salt Sampling Technology Development – Vanderbilt University and University of Michigan**SECTION B. Project Description**

Vanderbilt University (VU), in collaboration with the University of Michigan (UM), proposes to develop and demonstrate a modern equivalent to the Molten Salt Reactor Experiment (MSRE) Sampler-Enricher (S-E) that allows reactor operators to sample the hot fuel salt as well as insert additional fuel salt and control materials. The tasks associated with this project are (1) Complete a comprehensive investigation of historical molten salt system technical documentation to fully characterize the modern day (MD) S-E interfacing systems and functional requirements; (2) Develop an initial MD S-E conceptual design that incorporates modern-day technological advances, design standards, and previous molten salt system experience; (3) Perform reliability modeling of MD S-E concurrently with design development process; (4) Create initial physical prototype of conceptual MD S-E design; (5) Perform preliminary testing of MD S-E at VU LASIR facility; (6) Perform design changes and develop second iteration physical prototype (if necessary); (7) Perform comprehensive testing of revised prototype in molten salt environment; and (8) Assess performance and reliability of the final MD S-E prototype. Existing laboratory facilities will be used.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage and Chemical Waste Disposal – The high-temperature fluoride salt test facility (HT-FSTF) constructed in CSRB 430 will be used to test a new sampling-enriching system design to be developed in this project. HT-FSTF uses FLiNaK, a mixture of LiF, NaF, and KF as the working fluid in its primary and secondary loops. Approximately 300 kg of FLiNaK will be used/stored and then disposed of (in five to ten years). UM is currently in the process of working with the Office of Environment, Health and Safety (EHS) to develop a procedure to handle use and disposal of the chemicals. The University does have programs in place for existing laboratories for their proper storage and use of chemicals, and the disposal of waste.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not “connected” nor “related” (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial development.

Justification: The activity consists of university-scale research activities to develop a modern-day S-E to allow for sampling and chemical control of a molten salt reactor.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on 08/6/2019